Apr 27th, 3:00 PM - 4:00 PM

Are Robots Animate or Inanimate? Children's pronoun use provides insight to categorization challenge

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Are robots animate or inanimate?

Children's pronoun use provides insight into categorization challenge

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Introduction

- Children have been shown to attribute a unique constellation of animate and inanimate characteristics to robots [1-5].
- In this study we measured children's pronoun use to assess their implicit understanding robots (e.g. new ontological category [5]).

Predictions:

1. **Children will use more gendered pronouns (particularly male) with the robot** compared to the puppet.
2. **Researcher's pronoun use will influence participant's pronoun use** more for the robot than the puppet.

Method

Participants (*N*=90)

- 5 years (*N*=30, *M*=5.5 *SD*=.28; 50% girls)
- 7 years (*N*=30, *M*=7.4 *SD*=.32; 50% girls)
- 9 years (*N*=30, *M*=9.4 *SD*=.24; 50% girls)

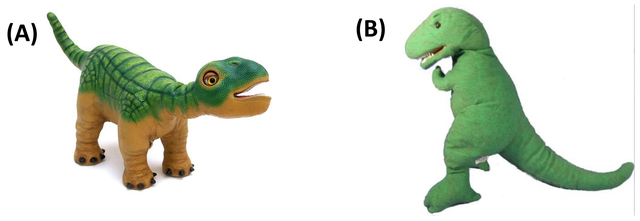

Figure 1. *Robot (A) and Puppet (B).*

Procedure

Participants were presented with an autonomous robot ("Pleo"; www.pleoworld.com) and a stuffed animal puppet ("Kasey") in a counterbalanced order (Figure 1). The procedure included, in order:

- **Familiarization Period.** Participants were familiarized through five introductory activities with the entity (e.g., feeding with a leaf, petting, playing tug-o-war).
- **Free Play.** Participants played on their own with the entity for up to 5 minutes.
- **Attribution Interview.** Assessed participant's attributions to the entity (17 randomly-ordered questions)

The procedure was then repeated for the other entity.

Measure

- **Pronoun Use.** We coded gendered (he/him, she/her) and neuter (it) pronoun use by the *participant* and *researcher* during the Familiarization phase and Attribution Interview.

Results

Prediction 1:

- **Children used proportionately more gendered pronouns for both entities.**
  - Robot (*M*=.82, *SD*=.25, *t*(89)=12.180, *p*<.001)
  - Puppet (*M*=.79, *SD*=.28, *t*(88)=9.974, *p*<.001).
- **Children used significantly more male-gendered pronouns with the robot**, *t*(88)=8.210, *p*<.001.
- **Children used significantly more female-gendered pronouns with the puppet,** *t*(88)=-8.399, *p*<.001.

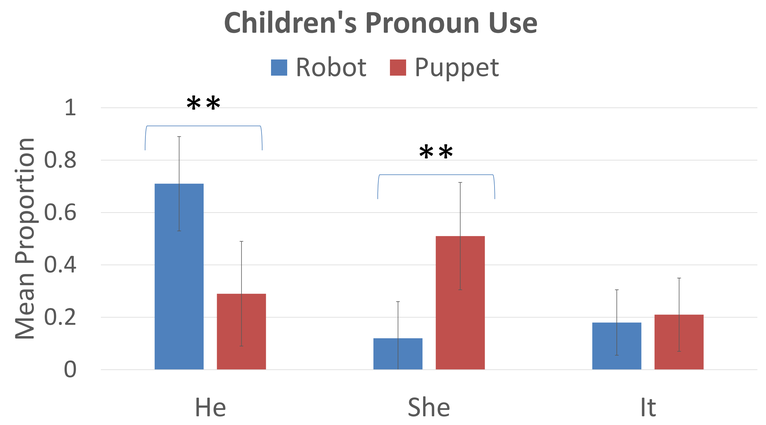

Figure 2. *Children's Pronoun Use with Robot and Puppet.* ***p*<.001

Prediction 2:

- **Robot**: Researcher's female-gendered pronoun use positively predicted children's female-gendered pronoun use (β=.40, *t*=4.096, *p*<.001).
- **Puppet:** Male- and female-gendered pronoun use were each positively predictive of children's gendered pronoun use.
  - Male pronouns: β=.33, *t*=3.279, *p*=.001
  - Female pronouns: β=.35, *t*=3.505, *p*=.001
- Researcher used more neuter pronouns for both entities, *p*s<.001 (Figure 3).

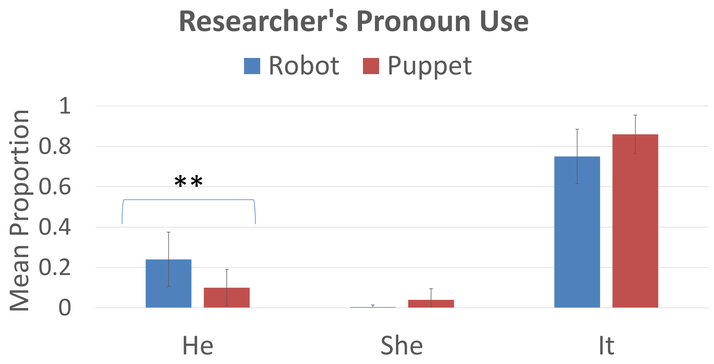

Figure 3. *Researcher Pronoun Use with Robot and Puppet.* ***p*<.001

- **No age differences** in children's pronoun use (*p*s>.32).
- **Gender differences**: Girls used neuter pronoun ("it") more.
  - Robot: girls (*M*=.23, *SD*=.30) vs. boys (*M*=.12, *SD*=.19), *t*(88)=-1.971, *p*=.05.
  - Puppet: girls (*M*=.28, *SD*=.31) vs. boys (*M*=.14, *SD*=.22), *t*(88)=-2.319, *p*=.02.

Conclusions

- Children **implicitly conceptualize the robot and puppet in gendered-terms** (robot as male, puppet as female), which is **remarkable given that both entities are objects.**
- **Children took a cue from the researcher in interpreting the puppet in gendered terms**, as both male- and female-gendered pronoun use positively predicted male- and female-gendered pronoun use in children.
- **For the robot, children only showed sensitivity to the researcher's female-pronoun use,** perhaps because it was inconsistent with their conceptions of the robot as male.
- Using an implicit measure (pronoun use), this research provides important insight on how children conceive of personified robots as a new ontological category – that is, in-between animate and inanimate.

References

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Acknowledgements. This research was supported, in part, by a UM University Grant Program Small Grant (No. 325453) to R.S.
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406-243-4384